# CONTEXT-SENSITIVE PERSONAL SITES AND MEMBERSHIP CHANNELS

## REFERENCE TO RELATED APPLICATION

The present application claims priority to U.S. provisional patent application Serial No. 60/156,956, entitled "SmartChannels.Net™: Context-Sensitive Personal Sites and Membership Channels," and filed September 30, 1999, which is incorporated herein by reference as if fully set forth.

## FIELD OF THE INVENTION

The present invention relates to an apparatus and method for implementing a dynamic reconfigurable personal site for organizing, retrieving, and displaying content from a network such as the Internet.

## BACKGROUND OF THE INVENTION

Browser programs permit the retrieval and display of content from the Internet. Browsers access web sites using Uniform Resource Locators (URLs) and display the content in pages. In order to locate content, a user must know the URL identifying the location of the content and enter it into the browser. Alternatively, a user can access an on-line search engine to search for content on the Internet using key words. Search engines, however, often retrieve much irrelevant content since information on the Internet is not organized in a consistent or structured manner. Therefore, locating particular content on the Internet can be a time-consuming and frustrating process. In addition, when content is located at a particular web site, a user typically must manually access the web site each time content from the site is desired. This process requires the user to remember or specify the URLs for the various web sites and manually access them with the browser. The browser, however, does not permit the user to organize the content or collection of URLs in any manner.

Accordingly, a need exists for improvements in accessing, displaying, and organizing content from the Internet or other type of network.

## SUMMARY OF THE INVENTION

A method and apparatus consistent with the present invention organizes content in a channel communicating over a network with content sites. The method and apparatus include specifying a channel node having a network address, specifying sub-nodes each selectively having a pointer to particular content, and selectively specifying pages associated with the sub-nodes. The channel node is linked with the sub-nodes, and the pages are also linked with the sub-nodes. A representation is displayed of the channel node, the sub-nodes, and the linking of the nodes and the pages for use in navigating the channel.

A structure consistent with the present invention is used for electronically organizes content in a channel communicating over a network with content sites. The structure includes a channel node having a network address, sub-nodes each selectively having a pointer to particular content, and pages associated with the sub-nodes. The structure includes links between the channel node and the sub-nodes, and links between the pages and the sub-nodes.

A context-sensitive personal sites and membership channel system consistent with the present invention includes a personal-site application software that provides access to a personal site. An identity and context server and database, operatively connected to the personal-site application software, consolidates, indexes, standardizes, manages, and distributes pages and data through the personal site. The site also includes structured and unstructured data and application sources.

## BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are incorporated in and constitute a part of this specification and, together with the drawings, explain the advantages and principles of the invention. In the drawings,

FIG. 1 is a diagram illustrating a navigator accessing various channels and displaying content using a browser;

FIG. 2 is a diagram illustrating a node structure for a channel;

FIG. 3 is a diagram of exemplary components of a machine for using the navigator;

FIG. 4 is a flow chart of an administration routine;

FIGS. 5a and 5b are a flow chart of a navigator routine;

FIG. 6 is a screen illustrating display of channel nodes for selection;

FIG. 7 is a screen illustrating node identifiers associated with the nodes for selection; and

FIGS. 8-26 are diagrams of an exemplary database schema for implementing the navigator and a channel.

**DETAILED DESCRIPTION**

Introduction

SmartChannels.Net™ ("SmartChannels") is a platform and tools for building a new generation of computing and communication applications that bring together the worlds of personal computers, legacy systems, and the Internet. The terms "SmartChannels.net" and "SmartChannels" are trademarks of SmartChannels.net and are used only as labels for one exemplary embodiment.

SmartChannels is page numbering for the Internet. SmartChannels provides context-sensitive membership channels that are dynamically configured web-enabled applications embracing and integrating the Internet and client/server models of computing. These SmartChannels are facilities through which cooperating people and systems can organize and coordinate the exchange of data and documents, and maintain a shared context for collaboration and communication. This collaboration and communication is accomplished by members (or subscribers) accessing a personal site that is connected to SmartChannels Identity and Context management software.

Each SmartChannel is a self-contained system that unlocks internally and externally stored content and functionality and provides subscribers with a single source for personalized information and action. The content can be located at a variety of locations, including, for example, on a local hard-drive, a company's internal file server, Intranet,

databases, third-party databases, Extranet, or Internet web sites. SmartChannels are designed to deliver context-sensitive content to a subscriber's own secure personal site. For example, a user can enter a channel sometimes as an employee and sometimes as a parent. The personal site provides access to content relevant to a specific role or inquiry initiated by the subscriber. Therefore, SmartChannels is an intelligent means of passage for content and work to flow within the setting of a unifying purpose or identity.

SmartChannels is a new kind of web channel technology that makes the Internet easier to use and more meaningful. SmartChannels offers a flexible, personalized, and adaptive platform for enabling "trust relationships" with members and resources. The underlying SmartChannels technology is subject matter independent, and therefore, has broad commercial applicability.

The SmartChannels membership channels are structured into a number of sub-systems. These sub-systems include: architecture, programming, networking, and platform integration. A number of architectural models are discussed below, and in the architectural overview in the related provisional application, to illustrate the sub-system structure of the channels. The models describe the SmartChannels technology from seven vantage-points: conceptual, logical, software application components, product platform, market applications, physical architecture, and security architecture.

According to the logical architecture, SmartChannels is a pipe with two ends. Assuring access to the systems that provide services, data, and applications to the subscribers is addressed on the right-hand side of the pipe. Making all the content and actions relevant and easier to use to the subscribers is addressed by the left-hand side of the channel. SmartChannel manages the context of the content and the identity of the subscriber to provide the content to the subscriber in a relevant and meaningful manner.

A SmartChannel can be sponsored by an entity such as a business, an institution, or an organization. The entity sponsors the SmartChannel for its members, whether they are employees, customers, or other affiliated members. Individual members have their own

personal site. This site may or may not include visitors. The individual members each have a data double or a "virtual me" which is a name space on a server that is representative of the member. The name space will have a user repository of data and information that identifies the member. Each individual member may have multiple data doubles representing the individual in a different manner (e.g., a business data double and a personnel life data double).

The personal sites serve the individual members. The personal sites are unique, personalized, customizable, and adaptable. These sites provide the individual members with context-sensitive navigation and transactions. By managing the context and the subscriber's identity (the data double), the personal site provides information that is relevant and of interest to the subscriber from the network. When the subscriber accesses through the personal site, the identity or data double virtually moves with the subscriber so that the service providers provide targeted and relevant services and information based on the data double. Using privacy preferences, the SmartChannel exchanges information from the subscriber's data double with the service providers to provide more personalized content. The subscriber's personal information can be distributed without making the information personally identifiable to the subscriber. SmartChannel only shares the subscriber's information to the extent the subscriber has an authorized SmartChannel. In this manner, the SmartChannel provides enhanced browsing for the subscriber.

One manner in which the SmartChannel provides enhanced browsing is through the selection navigator. The selection navigator is part of the adaptive framework. The selection navigator provides a hierarchal listing of a site's different areas with sections and pages. This hierarchal listing is a static approach, but, the selection navigator also provides a dynamic approach. The subscriber can provide explicit search criteria, and utilizing Structured Query Language (SQL), the selection navigator will dynamically assemble the web pages corresponding to that criteria; for example, for the query "show me the products that match my profile", web pages corresponding to that criteria will be found and

assembled for easy browsing by the selection navigator. Grouped SQL criteria can be used so that the selection navigator stores the criteria and updates the dynamically assembled web pages corresponding to the criteria when new data appears. The selection navigator is flexible and works in the back-end, or behind the scenes using back-end rules and logic.

The back-end services and rules permit matching to be done. One type of possible matching is life-event matching. For example, if a member provides information about life events such as a promotion, a marriage, or a pregnancy, SmartChannels can be triggered to provide content suited to those events. For example, the SmartChannel might have a relationship with a baby-food manufacturer, and might inform the baby-food manufacturer that some of its members are having babies. In exchange for this information, the baby-food manufacturer might provide discounts on baby food. The personal site of the pregnant members would then say: "congratulations on your up-coming baby...here is some discount on baby-food."

Therefore, SmartChannels acts as a intermediary between service providers, the SmartChannel sponsor, and the members. The service provider may be a benefits provider, such as healthcare or a 401(k) manager. SmartChannels provides assurance to the member of security and privacy to the extent desired and permission-based access to the members for the service provider. SmartChannels organizes and coordinates the content provided by the service providers based on the information in the data double provided by the members. The organized and coordinated content is presented through the members personal site. The member specifies what level of information from the data double to be released to the service providers. The greater level or more information released, the better context and identity management provided.

Through the SmartChannels, the service providers can specifically make privacy proposals to the members. For example, the baby-food manufacturer can propose free one-month supply of diapers in exchange for the members actual identity and address. The member can determine what information will be provided, what may be shared and with

what service providers it may be shared, how the information will be used, and whether the data is to be used in an identifiable way. The member can delegate to SmartChannels decisions about exactly how the member wants information shared and can tailor the member preferences so that there is a web of trust around the web site. The SmartChannel enables this customization of the member's personal site.

A SmartChannel can also facilitate exchange of information between service providers or others. In particular, service providers can specify on their personal site how to interact with them and order services from them. Therefore, anyone requesting services from them can access the service provider's channel and obtain the necessary specifications for ordering from the service provider. Those specifications can be set forth, for example, in Extensible Markup Language (XML). An example of specifications for business-to-business exchange of information is the Universal Description, Discovery and Integration (UDDI) specifications, described in the following documents, which are incorporated herein by reference: UDDI XML Structure Reference, UDDI Programmer's API Specification, UDDI Executive White Paper, and UDDI Technical White Paper, all by Ariba, Inc., International Business Machines Corporation and Microsoft Corporation, September 6, 2000.

The channels can exist for a wide variety of domains. Examples include, but are not limited to, the following categories: world; spirituality; education; play; money; health; family; and work and career. A channel for each of these categories can be organized with a node structure that, for example, further divides the category into sub-categories among the sub-nodes. The content for the channels can be dynamically changed, as well as the node structure for it. The domains can be sponsored or accessed by, for example, individuals, groups, corporations, business entities, retail establishments, or any other entity. Any combination of sponsors and channels (domains) can exist.

Channel Structure for Personal Site

FIG. 1 is a diagram illustrating a navigator accessing various channels and displaying content using a browser for a personal site 10 to implement a SmartChannel. A navigator 14, implemented as a software program, operates essentially as a wrapper around a browser 12. Navigator 14 uses browser 12 to implement various channels 16 to 20. Each channel contains a collection of nodes and pages, explained below, for organizing content, and each node can be associated with a particular URL for use in retrieving content. The term "node" refers to any structured elements that can be linked together, and the term "page" refers to any collection of content for display. Using browser 12, navigator 14 accesses various content sites 18 to 22 via channels 16 to 20 for retrieving and displaying content to the user. The content sites can exist, for example, at those locations identified above, either remote from the user's machine or local to it.

FIG. 2 is a diagram illustrating a node structure for a channel such as channel 16 or 20. Each channel includes a collection of nodes having parent-child relationships for organizing the content of the channel. Each channel includes a channel node ID and URL 30, or other network address, defining an entry point to the channel. Each channel node 30 can be linked with sub-nodes 32 to 34, and each sub-node can be further linked to nodes at another level such as nodes 36 to 38 for sub-node 32. Each sub-node at a lowest level can be selectively linked, meaning it can be linked but does not necessarily need to be, with particular pages, such as pages 40 to 42 for sub-node 36. The content for the pages can be obtained using the URL for the corresponding sub-node. Pages 40 to 42 can be formatted, for example, as web pages in HyperText Markup Language (HTML) or in another format.

As shown, each node and page can be selectively linked, meaning it can be linked but does not necessarily need to be, with a particular URL or pointer for use in retrieving content. The nodes can be further associated with node identifiers for use in organizing and linking them. Each node can thus be used to retrieve and display content, in addition to organizing the content. For example, channel node 30 can be associated with a home page

identifying the channel, and each sub-node can be associated with an introductory page identifying or explaining content in lower levels linked to the sub-nodes.

The channel can include multiple hierarchical levels having more or fewer levels than shown and having any number of nodes at a particular level. This type of structure permits flexibility in defining a dynamic organization of networked content, and each channel can be dynamically reconfigured by adding or deleting nodes. The channel thus includes both content and context. The content is the actual data or information, and the context is the manner in which it is organized with the node structure. Appendix A includes an example of nodes for a channel and the linking of nodes and pages using node identifiers and page identifiers.

Appendix A also illustrates the ability to perform searching, sorting, and other similar functions on the list of nodes. The first page of Appendix A illustrates sections to enter a column value, a comparison such as a boolean operation, and a value. Selection of the filter button can trigger a program to electronically search or sort through the nodes satisfying the information entered in the column, comparison, and value sections. Therefore, a user can search or sort the list for nodes relating to a particular topic or type of content. Other types of searching and sorting can be performed on the list of nodes, using conventional programs for electronically searching and sorting information, to manage the list of nodes.

Machine for Executing the Navigator

FIG. 3 is a diagram of an exemplary machine 50 for using the navigator. Machine 50 can include a connection with a network 59 such as the Internet, a wide-area network, or a local area network. Machine 50 can retrieve remote content for a channel via network 59 from, for example, web sites, remote servers, remote storage devices, or other machines connected to network 59. Content can also be retrieved locally for a channel. Machine 50 typically includes a memory 51, a secondary storage device 58, a processor 57, an input device 54, a display device 55, and an output device 56.

Memory 51 may include random access memory (RAM) or similar types of memory, and it may store one or more applications 52 and a web browser 53 for execution by processor 57. Applications 52 may correspond with software modules to perform processing for embodiments of the invention. Examples of web browsers include the Internet Explorer program by Microsoft Corp. and the Netscape Navigator program by Netscape Communications, Inc. Web browsers, also referred to as browsers, include any program for retrieving content locally or from a network and displaying it in a structured format such as pages.

Secondary storage device 58 may include a hard disk drive, floppy disk drive, CD-ROM drive, or other types of non-volatile data storage. Processor 57 may execute applications or programs stored in memory 51 or secondary storage 58, or received from the Internet or other network 59. Input device 54 may include any device for entering information into machine 50, such as a keyboard, key pad, cursor-control device, touch-screen (possibly with a stylus), or microphone. Display device 55 may include any type of device for presenting visual information such as, for example, a computer monitor, flat-screen display, or display panel. Output device 56 may include any type of device for presenting a hard copy of information, such as a printer, and other types of output devices include speakers or any device for providing information in audio form. Machine 50 can possibly include multiple input devices, output devices, and display devices.

Example of machines for implementing machine 50 to execute the navigator include the following: personal computers, laptop computers, notebook computers, palm top computers, network computers, Internet appliances, personal digital assistants (PDAs), or any processor-controlled device capable of executing a browser.

Although machine 50 is depicted with various components, one skilled in the art will appreciate that this machine can contain additional or different components. In addition, although aspects of an implementation consistent with the present invention are described as being stored in memory, one skilled in the art will appreciate that these aspects can also be

stored on or read from other types of computer program products or computer-readable media, such as secondary storage devices, including hard disks, floppy disks, or CD-ROM; a carrier wave from the Internet or other network; or other forms of RAM or read-only memory (ROM). The computer-readable media may include instructions for controlling machine 50 to perform a particular method.

Navigator Processing

Navigator 12 is typically implemented as a software module wrapper, such as application 52, around browser 14 for intercepting and processing communications to and from the browser. FIG. 4 is a flow chart of an administration routine 60 implemented by navigator 12. Routine 60 is used to perform various administrative functions such as creating or sponsoring a channel, deleting a channel, or modifying a channel. In routine 60, the navigator determines if a user wants to create a channel (step 62); if so, the navigator permits the user to enter an identification of a channel (step 64) and identification of sub-nodes (step 66). The information entered for the nodes can include, for example, the information shown in Appendix A such as node identifiers, page identifiers, and URLs for the nodes and pages. The navigator links the nodes according to a user-specified or default structure and stores the channel (step 68).

The navigator determines if the user wants to delete a channel (step 70). If the user wants to delete a channel, the navigator can determine if the user is authorized (step 72). For example, a user can be authorized to delete only those channels that the user has created. If the user is authorized, the navigator receives an identification of a channel (step 74) and removes the nodes for the channel (step 76).

The navigator also determines if the user wants to modify a channel (step 78). If so, the navigator can determine if the user is authorized to modify the channel (step 79). For example, the user can be authorized to modify only those channels that the user has created. If the user is authorized, the navigator receives an identification of a channel (step 80) and a modification of the nodes for the channel (step 82). The modification can include any

change to the channel such as the user adding nodes or sub-nodes, deleting nodes, changing the hierarchical relationships between nodes, or adding or changing URLs for the nodes or pages. The user can enter the exemplary information shown in Appendix A for the modifications. Based upon the information entered for modification, the navigator reconfigures the nodes for the channel (step 84).

FIGS. 5a and 5b is a flow chart of a navigator routine 90, implemented by navigator 12 and permitting a user to access content through channels and perform browser functions. In routine 90, the navigator receives log in information from a user (step 92) and determines if the user is authorized (step 94). The navigator can require that a user enter a user identifier and password, and it can maintain a database of user identifications and corresponding passwords to authenticate users. If the user is authorized, the navigator retrieves the user's channel and displays an identification of nodes (step 96). The navigator can link the user identification with the user's channel in order to retrieve the channel based upon the user's log in information. The user's channel includes an identification of the nodes and linking between them as illustrated in FIG. 2.

The navigator can thus define a separate collection and linking of nodes for each channel, and assign users to channels. Since each node can contain a URL or pointer to content, the content need only be stored in one location, for example, and the navigator can dynamically retrieve and build a particular channel based upon its node structure and specified URLs. Also, the content can be updated at its stored location, and the navigator can therefore retrieve the most current content using the URLs to locate it. Each user can also define or sponsor their own channel and, by determining which nodes to include in their channel, the users can in effect limit access to only the content referenced by those nodes. If a user has access to a particular node, then the user also has access to all sub-nodes in this example.

Table 1 illustrates how the navigator can maintain a database associating a user's identifiers and passwords, or other unique authentication information, (the log in information)

with the user's authorized channels for displaying an identification of those channels. As indicated above, using data doubles the user can have multiple on-line identities each linked with potentially a different collection of channels.

| Table 1 | | |
|---|---|---|
| user identity | password | user's authorized channels |
| identifier 1 | password 1 | channel 1 |
| | | channel 2 |
| | | . . . |
| | | channel N |
| . . . | | |
| identifier N | password N | channel 1a |
| | | channel 2a |
| | | . . . |
| | | channel Na |

FIG. 6 is a screen 130 illustrating display of a user's channels for step 96. Screen 130 can be formatted, for example, in HTML for display as a web page by the browser on display device 55. Screen 130 includes a navigator section 132 for displaying an identification of the nodes for the user's channel. The user's personal site is represented by a node 133 for the user's channel. This example includes other channels such as a node 134 for a BTI process, which can represent a channel sponsored by the user's employer for providing employment-related information to the user. BTI process node 134 includes sub-nodes as represented by the indentation such as an information gathering node 136. In the displayed structure of a channel, the triangle symbols represent nodes and the square symbols represent pages. Other types of symbols can be used. Screen 130 includes a content section 140 for displaying content in pages as selected in navigator section 132. It

also includes a toolbar 142 for identifying context-sensitive actions and conventional browser-type functions.

After displaying screen 130 for the user's channels, the navigator detects if the user selects a node or page in navigator section 132 (step 98). The user can make the selection by using, for example, a cursor-control device to "click on" the symbol for the node or page. The navigator determines if the selected node is a selector node, used for searching within the channel (step 99). If the user selected a selected node, the navigator displays a search page (step 101) and receives a search query entered through the page (step 103). The navigator searches within the content of the channel for the search query (step 105) and displays results of the searching (step 107). Any type of search engine can be used for searching the channel content. This feature provides a user with a method of performing a focused search, as the search occurs within the structured content of the channel.

For other selected nodes, the navigator expands the list in navigator section 132 to display the sub-nodes (step 100). As further sub-nodes are selected, the navigator continues to expand the list to show the channel structure. For a selected page within navigator section 132, the navigator retrieves content using a URL associated with the node (step 102) and displays it in content section 140 (step 104). The information can be retrieved over the Internet using the URL, from another type of network, or locally on the user's machine. The URL represents a pointer to the content, which can be modified or updated. The navigator can thus obtain the most current content by retrieving it upon selection of a page. Instead of URLs, other types of pointers or identifiers can be used to access or identify a location of content.

The navigator determines if the user de-selects a node (step 106). A user de-selects a node by, for example, using a cursor-control device to "click on" a node that has been expanded. Upon detecting the de-selection, the navigator contracts the displayed list of sub-nodes for that node (step 108).

The navigator determines if the user selects a browser function (step 110). The user can select a browser function by, for example, using a cursor-control device to "click on" one of the symbols in toolbar 142. The browser functions can include conventional browser functions such as a back command, forward command, refresh command, home command, a list of "favorite" sites, or a search command. Upon selection of a browser command, the navigator passes the command along to the browser for it to execute the command (step 112).

The user can possibly attempt to access other channels (step 114). For example, the user can enter new log in or user identification information. If the user attempts to access other channels, the navigator determines if the user is authorized (step 116) and, if authorized, the navigator retrieves the new channel information and displays nodes for it (step 118). The navigator can continue to execute functions based upon commands entered by the user until the user logs off (step 120).

FIG. 7 illustrates in screen 130 node identifiers associated with the nodes for selection. This screen can be displayed, for example, to a database administrator or other person authorized to view it. As further shown in Appendix A, the node identifiers are used to create the links between nodes and sub-nodes, and between nodes and pages, for configuring channels. The nodes in this example include site area (sa) nodes such as node 150; section (sc) nodes such as node 152; and page (pg) nodes such as node 154. Other types of nodes include user group (ug) nodes and selector (mg) nodes, as identified in Appendix A. Site area and section nodes identify context, page nodes identify content, and user group nodes identify particular user groups. Selector nodes, as explained above, are used for searching within a channel. These labels for the nodes are one example of classifying nodes, and different labels and classifications can be used.

Each channel typically has its own database schema, and FIGS. 8-26 are diagrams of an exemplary database schema for implementing a channel. This schema can be

repeated for additional channels. In FIGS. 8-26, FIG. 8 illustrates how FIGS. 9-26 fit together in order to collectively illustrate the exemplary database schema.

While the present invention has been described in connection with an exemplary embodiment, it will be understood that many modifications will be readily apparent to those skilled in the art, and this application is intended to cover any adaptations or variations thereof. For example, different navigator processing, labels for the database schema and routines, and network addresses, may be used without departing from the scope of the invention. This invention should be limited only by the claims and equivalents thereof.